BOOK REVIEWS

CLASSICAL MECHANICS, by T. W. B. Kibble (Maidenhead : McGraw-Hill, 1966) Pp. XV +296 £. 3

This book has originated from a course of lectures delivered by the author to honours students at Imperial College, London. In this book the author has treated classical mechanics as a branch of physics rather than applied mathematics. This approach is, indeed, very important for people who would like to view this subject from physicist's point of view. Since not much attention is devoted to classical physics by Universities, there is always a danger of underestimating the importance of classical mechanics in the proper understanding of the whole field of modern physics and students, consequently, may fail to gain an appreciation of the unifying ideas and concepts of the subject. Text books on this subject are very often dull because of the unimaginative presentation and therefore they fail to stimulate the students' interest. The author, in this book, has emphasized the importance of the role of classical mechanics in the basic structure of contemporary physics. This book does not demand too advanced mathematical knowledge in order to understand the important physical principles while at the same time without dispensing with essential vigor.

The first five chapters are concerned with the mechanics of the single particle. In chapter 2, perhaps more discussion should have been given to limiting cases of the solution of forced motion of a damped oscillator. This is because, such a discussion gives better insight to the physical problem. Again, regarding rotational motion, more emphasis should be given to the fact that the commutative law of addition is not satisfied by finite rotations.

Chapter 6 deals with the potential theory and its application to the problem of the earth's shape and tidal theory. A good feature is the problems suggested at the end of each chapter. Problems have been very carefully selected to show the utility of classical mechanics in many branches of physics.

Though the author has used a smaller number of diagrams in the book yet this book is an excellent one from the stand point of presentation of the ideas in a very lucid fashion. The book can be very highly recommenked as a stimulating and authoritative work to all people who want to learn classical mechanics.

A. S. C.

ELEMENTS AND FORMULAE OF SPECIAL RELATIVITY—E. A. Guggenheim, Pergamon Press (Oxford), 1967, p × 63 price: Hard cover $4.50. Flexi cover $ 2.50.

In this monograph many simple and important formulae of the special theory of rela. tivity are presented with short explanations. The book does not claim to be a text-book. It covers almost the entire field of application of the special theory. An interesting chronological account of the development of the special theory is given at the end. In the opinion of the reviewer, some references to the text-books and the literature available at the end of each chapter might have enhanced its usefulness. The book is specially meant ofor students of chemical physics but students of physics will also find it useful.

S. K. D

INTRODUCTION TO NUCLEAR REACTOR THEORY By John R. Lamarsh Published in 1966 by Addison-Wesley Publishing Company, INC., Massachusetts, U.S.A.

During the year 1967, some of us who were concerned with the conduct of an introductory course on Nuclear Reactor Theory to a batch of fresh post-graduate trainees have had occasion to consult and study this book along with other such books accessible to us in preparing lectures and problem sheets for the students. We have found the book to be very useful and would strongly recommend it for those who are interested in the subject of Reactor Physics with more than passing interest.

The book is neither 'over academic' nor a handbook of formulaes and we feel, lays the right amount of stress on both the conceptual and practical aspects of the subject without sacrificing mathematical rigour. It contains three introductory chapters on Nuclear and Neutron Physics for those who may not have been exposed to these before. The treatment throughout is essentially based on neutron diffusion theory. The author has avoided "the cumbersome mathematical machinery of space dependent transport theory, as these techniques do not contribute substantially to an understanding of the basic physical principles." The solution of the diffusion equation by the method of eigen function for point, plane and distributed sources has been discussed with great clarity. The method using the Wronskian of functions and the concept of reciprocity theorem is also touched, which is not very common. Chapter V is outstanding in this respect.

The chapter on slowing down treats the subject of resonance absorption with lucidity and detail. Mention must also be made of the elucidation of control rod theory which is excellent.

Not much emphasis has however been given in the book to actual reactor types or design problems. Also the author seems to have carefully avoided giving cross references to original papers.

Care has been taken to use only internationally accepted symbols, units, and nomenclature throughout the book. A good collection of problems is given at the end of each chapter although it is our opinion that inclusion of atleast some typical solved problems may have gone a long way in illustrating the subject matter, in a direct manner. The well edited index at the end of the book is very helpful.

"Emphasis on teachability", meaning that the book is addressed mainly to the teacher-student community aptly summarises the tone of the book.

K. C. and M. S.

EARLY ELECTRODYNAMICS—THE FIRST LAW OF CIRCULATION—R. A. R. Tricker. Pp. 217, Pergamon Press, Inc. New York, 1965 Price : 17s. 6d. net.

The people who would enjoy reading it are the undergraduate students of our Indian Universities and also the Scientists and research students in physics who have a special facination to know the historical development of the "Early Electrodynamics", the developments which took place at Paris within a very short period of time from 1820 till 1826. As regards the object of this book we quote from the preface written by the author "The object of this book is to trace this branch of electrical theory to its origins and to show how the results achieved in those few early years have led to the various theorems which have since been deduced. This is not to maintain that the basis for the application of the theory is still to be found in the comparatively crude experiments of the early nineteenth century but an appreciation of its origin can lead to a better understanding of the logical structure of the theory.

The first law of circulation is $\oint$ B.ds $\rightarrow 4\pi$ ki. The reprints are from Oersted, Biot and Savart, Ampere and Grossman.

For the proper appreciation of the reprints the author has written three chapters presenting (*i*) the stage of development of electrodynamics at the time the papers appeared. This is the "State", (*ii*) "Dramatis Personae" i.e., a brief biography of the authors and (*iii*) "The Critics", the reaction of the scientific community caused by the appearance of the papers. The fourth chapter (commentary) gives the communications that existed among the authors of the papers, some of the more difficult passages from the papers, the modern view of the subject matter and also the scientific philosophy of Ampére.

The book is extremely well-written. The Author's presentation of the back ground material and the way of his discussion is highly commendable and he surely deserves a credit from the readers. This book should be read by all people who want to have a glimee at the historical developments of early electrodynamics by high ranking scientists like Oersted, Biot, Savart and Ampere, the stalwarts of the early nineteenth century.

KINETIC THEORY. Vol. 1.   THE NATURE OF GASES AND HEAT—S. G. Brush. Pp. 181
    Pergamon Press Inc., New York, 1965. Price : $ 4.95 (paperback).

It is impossible to learn physics by going through a few selected famous papers. But nevertheless by going through these articles such as the present collection of some early kinetic theory papers one visualizes the unfolding of great conceptual ideas in the proper historical sequence. Thus one realises that most of the great ideas are not immutable laws of nature but are products of human mind. Kinetic theory is a very early development in the history of science and therefore this is a proper subject for historical approach. This is because many of the present important ideas and tools of physical theory first came to prominence there, such as cross sections, reversibility, distinguish ability etc. The present collection contains some of the early papers on kinetic theory and the dynamical theory of heat, including some of those of Boyle, Newton and Bernoulli, the mean-free path treatment of Clausius and Maxwell the original derivation of the famous Mexwellian velocity distribution, and the famous virial theorem paper of Clausius. There are also papers by Mayer, Joule and Helmholtz.

The author deserves credit for placing the papers in proper historical sequence with a long general introduction connecting these famous contributions and also the individual summaries of the papers. This present volume could serve as supplementary reading in a course on statistical physics and I am very pleased to recommend it to others who are interested in the developments of kinetic theory.

A. S.

MEN OF PHYSICS :   L. D. Landau, vol. I, Low Temperature and Solid State Physics. D ter
    Haar, Ed. Pp. 196+X, Pergamon Press, Inc., New York, 1965. $ 2.95.

This book is the first of two volumes giving reprints of Landau's work.   As is well-known Landau's scientific output is tremondous covering practically all branches of theoretical physics

This book is the first of two volumes giving reprints of Landau's work. As is well-known Landau's scientific output is tremoundous covering practically all branches of theoretical physics from hydrodynamics to quantum electrodynamics, from chemical reactions to helium three or from X-ray scattering to electrolytic solutions. Landau has published over 100 papers of which only eight papers are presented in this volume : two on the theory of helium II, two on the theory of Fermi liquids, two on superconductivity, one on electron diamagnetism and one on ferromagnetism. Before presenting the reprints ter Haar has supplied a nice background information to make the reprints understandable to the intended audience. But

to my feeling the discussion by ter Haar is a bit sketchy. It could have been more exhaustive so that after going through the introduction the reader could have appreciated the systematic development of the brilliant ideas ingrained in the above-mentioned contributions of Landau even better.

Lastly thanks are due to the Pergamon Press who have undertaken to publish such a series of paper backs containing reprints or translations of pioneering papers in physics. Apart from the reprints together with a nice but short introduction by ter Haar, there is also a list of Books as well as a complete list of scientific publications of Landau, the eminent physicist of twentieth century. This book and also books of this kind will be very useful for the advanced students and researchers in physics.

A. S. C.

PROBLEMS IN PARTICLE PHYSICS—A. N. Kamal. Published by McGraw-Hill Publishing Company Limited. Pp 126. Price Sh. 38/-

Dr. Kamal has made an excellent collection of problems in elementary particle physics, it is something more than a collection because, wherever necessary, each problem is presented with an explanatory introduction. Of course it is assumed that the reader is familiar with the tools of quantum mechanics and the basic concepts of quantum field theory. The book is intended for experimental students doing high energy physics, but it will be useful also for the students doing theoretical physics in the same line. Quite often a beginner may have difficulty in working out some of the sophisticated problems ; when that is so, he has to refer to any of the standard books for which a comprehensive bibliography is provided at the end of each chapter or a group of so of allied nature. The purpose of the book is to make the ideas of field theories crystal clear to the reader if he has diligently solved the problems and the efforts to do so will stimulate him into further reading in a field the horizon of which is over-expanding with some loss of sharpness of the fringe points.

The author covers quite a wide field : The first three chapters deal with how the field quantities change under parity transformation, charge conjugation and time reversal. Fourth chapter introduces the postulate of invariance under combined operation of the above three, abbreviated as TCP theorem. The fifth chapter brings the idea of isobaric spin which is followed by the combined operation of charge conjugation and rotation in isobaric spin space. Chapters 7 and 8 deal with problems connected with the symmetries in the positronium, pp- and $K\bar{K}$- systems. Here the idea of ϕ-meson is introduced. The next two chapters give problems connected with $K^+ \to 3\pi$ decays, and K^o -meason theory. The chapters 11 and 12 refer to phase space calculations for two and three particles. The problems of chapters 13 and 14 arise from branching ratio connected with charge independence and $|\Delta I| = \frac{1}{2}$ rule The chapter 15 deals with the relative decay modes $\pi \to \mu/\pi \to e$ This is followed by the decay. $\pi^o \to 2\gamma$ in the next chapter. In chapter 17, the evaluation of the spins of $\pi-$ and $\phi-$ mesons is indicated with the help of principle of detailed balance. The chapters 18 and 19 are devoted to β -decay and the two-component neutrino theory. Finally in chapter 20, indication for the evaluation of the scattering cross sections of $\pi + p$, $\pi^- p$, $k^- p$, $\pi - II$ systems are given. Most appropriately the book ends with an appendix on spin summation.

D. B.